

PHILCO Model 645

SERVICE BULLETIN
No. 234



For Members of
RADIO MANUFACTURERS SERVICE
A PHILCO SERVICE PLAN

Model 645

General Specifications

TYPE CIRCUIT: Superheterodyne, with preselector R.F. amplifier, and push-pull pentode output (7 watts); built in connections for Philco All-wave aerial; aerial selector built into and operated by wave-band switch.

POWER SUPPLY: 115v., 60 cycle A.C.

TUBES USED: 1 type 78, R.F.; 1 type 6A7, Detector-Oscillator; 1 type 78, I.F.; 1 type 85, 2d Detector and 1st A.F.; 2 type 42 Push-Pull Output; 1 type 80 Rectifier.

WAVE BANDS: Three: (1) Short-wave; (2) Police, aircraft and amateur; (3) Standard.

COVERAGE OF EACH BAND: Band 1, 5.75-18 M.C.; Band 2, 1.75-5.8 M.C.; Band 3, 540-1750 K.C.

TUNING DRIVE: Dual planetary, ball bearing, .80 to 1 ratio for slow-speed tuning; glowing arrow wave band indicator.

PROGRAM CONTROL: 4-position, with bass compensation effective in first position (counter-clockwise).

INTERMEDIATE FREQUENCY: 460 K.C.

POWER CONSUMPTION: 85 watts.

SPEAKER: 645 Baby Grand Model—K31; Furniture Model—H21.

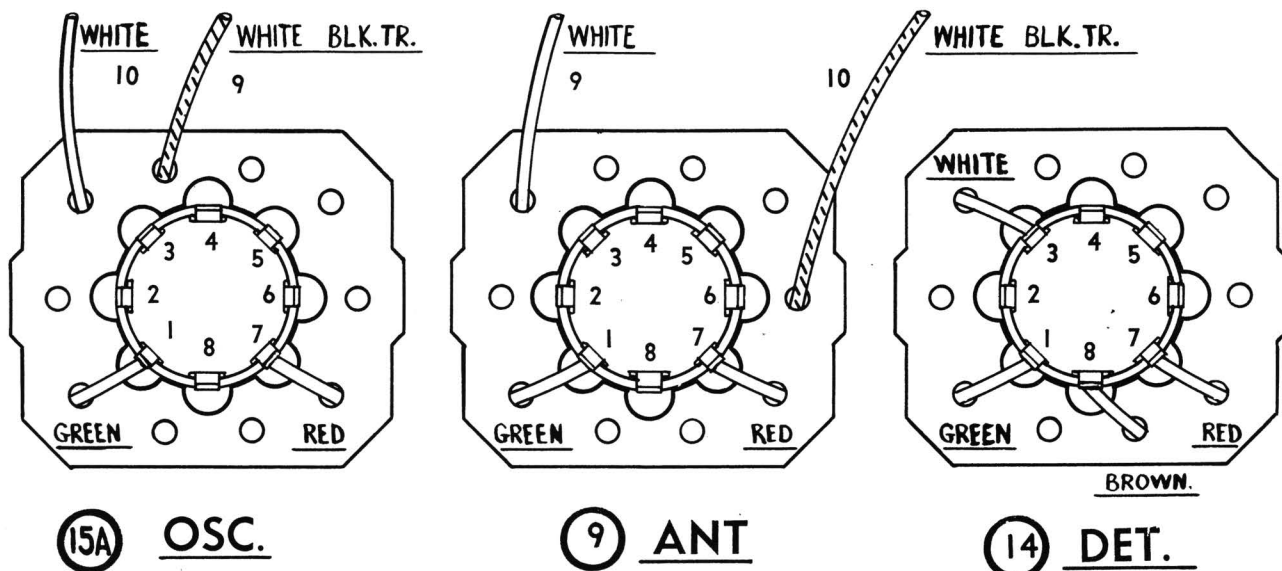


Fig. 1. R.F. Transformers

TUBE SOCKET VOLTAGES (Measured from Tube Contact to Gnd.)

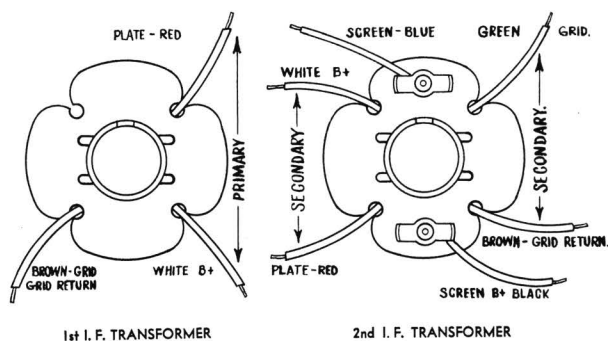


Fig. 2. I.F. Transformers

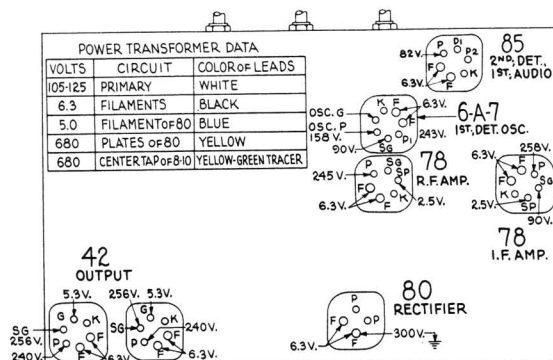


Fig. 3. Tubes as Viewed from Bottom

The voltages at the points indicated by the arrows above were obtained with a Philco type 025 Circuit Tester which contains a high resistance (1000 ohms per volt) voltmeter. Volume control at minimum, waveband switch at standard broadcast. K31 speaker.

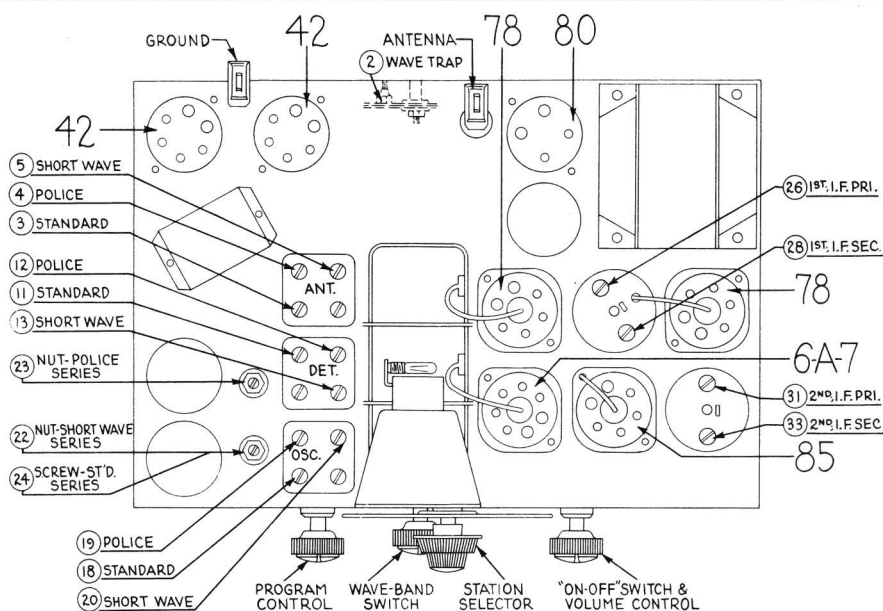


Fig. 4. Location of Compensating Condensers

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 645 requires an accurate signal generator covering I.F., standard-wave, police and short-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator**, having a continuous range of from 100 to 20,000 K.C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre-handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 4. Connect the output meter to the plate contacts of the type 42 output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

INTERMEDIATE FREQUENCY: Set the signal generator at 460 K.C. with attenuator set at minimum, connect a .001 mf. condenser in series with its antenna lead and attach it to the grid cap of the 78 I.F. amplifier tube. Connect ground lead to ground terminal on set. Set the dial at 55 and turn the waveband switch to position 3 (extreme left). Adjust the volume control of set to almost maximum, and the 088 attenuator so that about one-fourth ($\frac{1}{4}$) scale reading is had on the output meter. With a fibre screwdriver adjust condensers ⑩ and ③③ (2nd I.F.) for maximum reading on output meter. Turn attenuator of signal generator to minimum and remove its antenna lead from the grid of the 78 I.F. tube; place it on the grid of the 6A7. Adjust 088 attenuator as before, then proceed to adjust condensers ②⑥ and ②⑧ (1st I.F.) for maximum output meter reading. Then remove the 088 oscillator lead. Care should be taken to keep the output meter reading during adjustments at about one-fourth scale reading. This should be done by using the 088 attenuator control.

WAVE TRAP: Connect the Signal Generator antenna and ground leads to the antenna and ground posts of the set. With the signal generator operating at 460 K.C. and the set controls adjusted as before for I.F. alignment, adjust wave trap ② until a minimum reading is obtained in the output meter.

SHORT WAVE:. In adjusting the short wave or high frequency band, the det. compensator will have a tendency to "pull" or **change** the frequency of the oscillator. By shunting a padding or variable condenser (about .00025 Mf.) across the oscillator section of the gang (front section) and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this "pull" can be minimized. The procedure for tuning this band is as follows:

Set the dial of the receiver at 18 megacycles (top scale) and the 088 dial at the same frequency. Turn wave band switch to position 1 (extreme right). Connect the shunt condenser to the oscillator section of the gang and tune it so that the second harmonic of the oscillator beats with the 18 M.C. signal from the 088. Next tune condensers ⑤ and ⑬ (antenna and det.) for maximum reading of the output meter. Disconnect shunt condenser and tune condenser ②② (osc.) for correct dial calibration. The oscillator frequency, when correctly set, will be higher than that of the incoming signal and the image frequency lower. In order to check this it should be possible to pick up the image at approximately 17.1 M.C. by increasing the input from the 088 oscillator.

For the low frequency adjustment of this band, turn the dial to 6.0 M.C., set the signal generator at 6.0 M.C. and adjust condenser ②② (nut) for maximum output meter reading. Readjust condenser ②② at 18.0 M.C.

POLICE: Turn wave band switch to position 2 (center), set signal generator at 5500 and dial of set at 5.5. Adjust condensers ⑩, ④ and ⑬ (osc., ant., and det.) for maximum output. Turn the set dial to 1.8 and the signal generator to 1800. Adjust condenser ②③ (nut) (osc. series) for maximum output meter reading.

STANDARD WAVE: Turn waveband switch to position 3 (extreme left), set signal generator at 1500 and dial of set at 150. Now adjust the oscillator, antenna and det. "Standard" condensers. These are ⑬, ③ and ⑩ respectively. Turn the dial to 60, set signal generator at 600 and adjust condenser ④ (oscillator standard series), (screw) for maximum output meter reading.

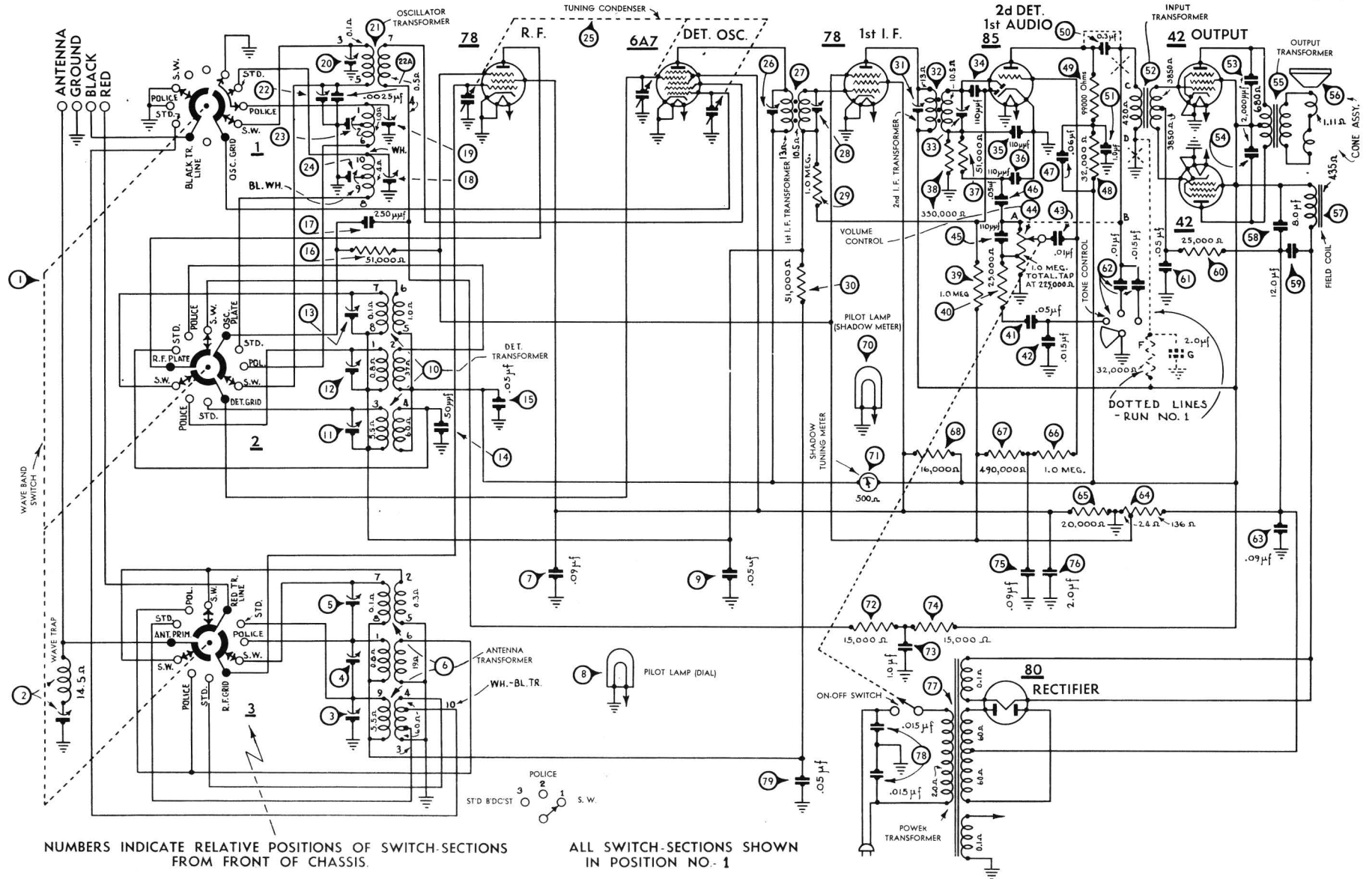


Fig. 5. Schematic Diagram of Model 645

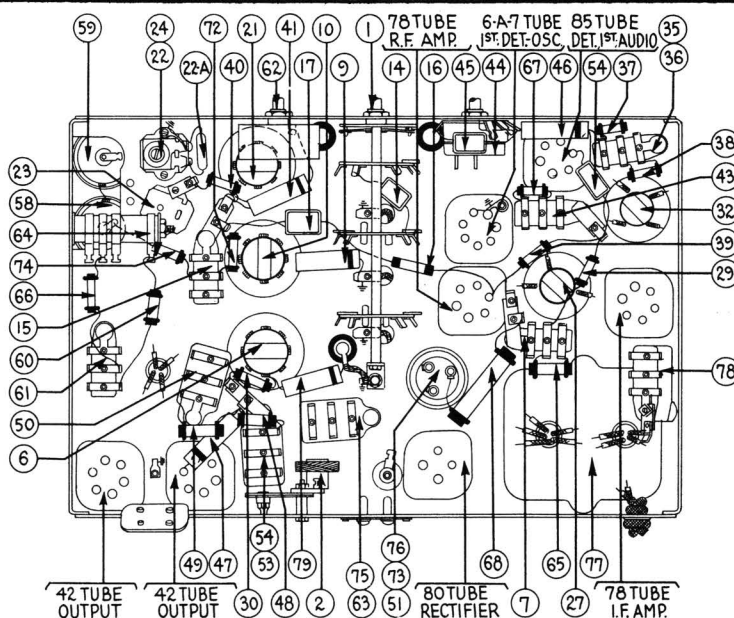


Fig. 6. Base View

Model 645

Schematic Number	Part and Description	Part No.	List Price	Schematic Number	Part and Description	Part No.	List Price
①	Wave Band Switch	42-1153	\$2.00	③②	Program Control	30-4406	\$0.75
②	Wave Trap	38-6850	1.10	③③	Condenser (.09 mf. Twin Bakelite)	4989-DG	.40
③	Compensator (Ant. Standard)	31-6058	.60	③④	B.C. Resistor (136 ohm, 24 ohm)	33-3236	.20
④	Compensator (Ant. Police)			③⑤	Resistor (20,000 ohm, 1 watt)	33-320433	.20
⑤	Compensator (Ant. Short-Wave)	32-1867	3.00	③⑥	Resistor (490,000 ohm, 1/4 watt)	33-449143	.20
⑥	Ant. Transformer			③⑦	Resistor (1.0 meg. ohm, 1/4 watt)	33-510143	.20
⑦	Condenser (.09 mf. Bakelite)	4989-SG	.35	③⑧	Resistor (16,000 ohm, 3 watt)	33-316633	.30
⑧	Pilot Lamp (Dial)	34-2039	.15	③⑨	Pilot Lamp (Shadow Meter)	34-2064	.09
⑨	Condenser (.05 mf. Tubular)	30-4020	.20	④①	Shadow Meter	45-2083	2.50
⑩	Det. Transformer	32-1868	3.00	④②	Resistor (15,000 ohm, 1/4 watt)	33-315133	.20
⑪	Compensator (Det. Standard)	31-6063	.50	④③	Electrolytic Condenser (1.0 mf.)	Part of ④③	
⑫	Compensator (Det. Police)			④④	Resistor (15,000 ohm, 1/4 watt)	33-315133	.20
⑬	Compensator (Det. Short-Wave)	30-1029	.20	④⑤	Condenser (.09 mf.)	Part of ④⑤	
⑭	Condenser (50 mmf.)			④⑥	Electrolytic Condenser (2.0 mf.)	Part of ④⑥	
⑮	Condenser (.05 Bakelite)	3615-SG	.35	④⑦	Power Transformer (110 V., 60 cycle)	32-7462	6.00
⑯	Resistor (51,000 ohms, 1/4 watt)	33-351143	.20	④⑧	Condenser (.015 mf. Twin Bakelite)	3793-DG	.40
⑰	Condenser (.00025 mf. Mica)	30-1056	.40	④⑨	Condenser (.05 mf. Tubular)	30-4020	.20
⑱	Compensator (Osc. Standard)	31-6058	.60	④⑩	Power Transformer (115 V., 25 cycle)	32-7407	9.00
⑲	Compensator (Osc. Police)			④⑪	Power Transformer (220 V., 50-60 cycle)	32-7464	6.50
⑳	Compensator (Osc. Short-Wave)	32-1976	1.75	④⑫	4-prong Socket	27-6044	.10
㉑	Osc. Transformer			④⑬	6-prong Socket	27-6036	.11
㉒	Compensator (Short-Wave Series)	31-6027	.70	④⑭	7-prong Socket	27-6037	.11
㉓	Condenser (.0025 mf. Mica)	7006	.40	④⑮	Speaker Socket	27-6043	.08
㉔	Compensator (Police Series)	31-6073	.50	④⑯	R.F. Transformer Shield	38-6921	.35
㉕	Compensator (Standard Series)	Part of ㉔		④⑰	I.F. Transformer Shield	38-6808	.25
㉖	Tuning Condenser Assy.	31-1555	4.50	④⑱	Tube Shield Base	28-2725	.03
㉗	Compensator (1st I.F. Pri.)	31-6053	.50	④㉑	Tube Shield Body	28-2726	.10
㉘	1st I.F. Transformer	32-1917	1.75	④㉒	Shadow Meter Light Shield	28-2917	.02
㉙	Compensator (1st I.F. Sec.)	Part of ㉘		④㉓	Electrolytic Condenser Clamp	6440	.05
㉚	Resistor (1.0 Meg., 1/4 watt)	33-510143	.20	④㉔	Electrolytic Condenser Insulator	27-7194	.01
㉛	Resistor (51,000 ohm, 1/4 watt)	33-351143	.20	④㉕	Dial Scale	25-5165	.10
㉜	Compensator (2nd I.F. Pri.)	31-6053	.50	④㉖	Dial Hub Assy.	31-1724	.15
㉝	2nd I.F. Transformer	32-1836	1.60	④㉗	Screen Bracket Assy.	29-3061	.07
㉞	Compensator (2nd I.F. Sec.)	Part of ㉝		④㉘	Scale Guard	27-8140	.01
㉟	Condenser (.00011 mf. Mica)	30-1031	.20	④㉙	Glowing Arrow Mask	27-5160	.20
㊱	Condenser (.00011 mf. Twin Bakelite)	8035-DG	.25	④㉚	Glowing Arrow Screen	27-5159	.10
㊲	Condenser (.00011 mf.)	Part of ㊱		④㉛	Mask Arm	29-3274	.03
㊳	Resistor (51,000 ohm, 1/4 watt)	33-351143	.20	④㉜	Link	29-3338	.03
㊴	Resistor (330,000 ohm, 1/4 watt)	33-433133	.20	④㉝	Coupling	29-3339	.06
㊵	Resistor (1.0 Meg., 1/4 watt)	33-510143	.20	④㉞	Sub. Base Mtg. Foot	29-2959	.03
㊶	Resistor (25,000 ohm, 1/2 watt)	33-325243	.20	④㉟	Chassis Mtg. Screw	W-1496-A	1.60C
㊷	Condenser (.05 mf. Tubular)	30-4020	.20	⑤①	Chassis Mtg. Washer (Rubber)	27-4201	1.40C
㊸	Condenser (.015 mf.)	Part of ㊷		⑤②	Chassis Mtg. Cushion (Rubber)	27-4202	.03
㊹	Condenser (.01 mf. Bakelite)	3903-SU	.25	⑤③	Knob (Tuning)	27-4206	.12
㊺	Volume Control (1.0 Meg. ohm)	33-5113	1.45	⑤④	Knob (Slow Speed Tuning)	27-4207	.10
㊻	Condenser (.00011 mf. Mica)	30-1031	.20	⑤⑤	Knob (Volume, Tone)	27-4208	.10
㊼	Condenser (.05 mf. Tubular)	30-4020	.20	⑤⑥	Knob (Wave Band)	27-4225	.10
㊽	Condenser (.06 mf. Tubular)	30-4123	.20	⑤⑦	Bezel	28-3164	.50
㊾	Resistor (32,000 ohm, 1/2 watt)	33-332333	.20	⑤⑧	Bezel Mounting Screw	W-1494	.30C
㊿	Resistor (99,000 ohm, 1/2 watt)	33-399343	.20	⑤⑨	Bezel Glass	27-8113	.07
①	Resistor (.3 mf. Twin Bakelite)	6287-DU	.40	⑤⑩	Bezel Glass Gasket	27-8036	.01
②	Elec. Condenser (1.0 mf., 1.0 mf., 2.0 mf.)	30-2080	1.85	⑤⑪	Shadow Screen	27-5120	1.50C
③	Audio Input Transformer	32-7532	4.25	⑤⑫	Speaker Cable	02722	.30
④	Condenser (.002 mf. Twin Bakelite)	7296-DU	.30	⑤⑬	Bottom Shield	38-7189	.40
⑤	Condenser (.002 mf.)	Part of ④		⑤⑭	Mask	28-3433	.25
⑥	Output Transformer	2585	1.25	⑤⑮	Pilot Lamp Bracket Assy.	38-6789	.50
⑦	Voice Coil Cone Assy. (B. G. K31)	36-3159	.80	⑤⑯	Front Bumper	27-4200	3.75C
⑧	Field Coil Assy. (B. G. K. 31)	36-3463	3.75	⑤⑰	Speaker Mtg. Bolt	29-3128	.02
⑨	Electrolytic Condenser (8. mf.)	30-2025	1.35	⑤⑱	Speaker Mtg. Nut	W-124-A	.35C
⑩	Electrolytic Condenser (12 mf.)	30-2117	1.50	⑤㉑	*Voice Coil Cone Assy. (Furn. H-21)	02625	1.20
⑪	Resistor (25,000 ohm, 1/2 watt)	33-325243	.20	⑤㉒	Field Coil Assy. (Furn. H-21)	36-3461	3.75
⑫	Condenser (.05 mf. Bakelite)	3615-SG	.35	⑤㉓	G. Elec. Condenser (2.0 mf.)	Part of 30-2080	
				⑤㉔	F. Resistor (32,000 ohm)	3525	.20

PRICES SUBJECT TO CHANGE WITHOUT NOTICE